

CLAIMS

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is as follows:

- 1 1. A waterproof recreational audio device for providing musical signals
2 to a user, comprising:
3 at least one transducer, such that said transducer enables music to
4 be heard by said user via transcutaneous bone conduction;
5 a means for said at least one transducer to be in vibratory contact
6 with the head of said user; and
7 means for waterproofing said at least one transducer.
- 1 2. The waterproof recreational audio device according to claim 1,
2 wherein said at least one transducer includes a plurality of transducers.
- 1 3. The waterproof recreational audio device according to claim 2,
2 wherein said plurality of transducers is arranged in an array.
- 1 4. The waterproof recreational audio device according to claim 2,
2 wherein the musical frequency range is split into three frequency channels.
- 1 5. The waterproof recreational audio device according to claim 4,
2 wherein said three frequency channels consist of:
3 a low frequency range,
4 a mid frequency range, and
5 a high frequency range.

1 6. The waterproof recreational audio device according to claim 3,
2 wherein at least one of said transducers in said array is an ultrasonic
3 transducer.

1 7. The waterproof recreational audio device according to claim 3,
2 wherein at least one of said transducers in said array is a vibrotactile
3 transducer.

1 8. The waterproof recreational audio device of claim 1, wherein said
2 audio device includes at least one amplifier.

1 9. The waterproof recreational audio device according to claim 1,
2 wherein at least one of said transducers is positionable at the front of the
3 head of said user.

1 10. The waterproof recreational audio device according to claim 1,
2 wherein at least one of said transducers in said array is positionable at the
3 back of the head of said user.

1 11. The waterproof recreational audio device according to claim 1,
2 wherein said transducer is associated with a band that encircles the head of
3 a user.

1 12. The waterproof recreational audio device according to claim 1,
2 wherein said transducer is associated with a hat that is worn on the head of
3 said user.

1 13. The waterproof recreational audio device according to claim 1,
2 wherein said transducer is associated with a helmet that is worn on the
3 head of said user.

1 14. The waterproof recreational audio device according to claim 1,
2 wherein said transducer is associated with a band of recreational eye wear
3 selected from the group consisting of swim goggles, ski goggles, snorkel
4 mask, and sun glasses.

1 15. The waterproof recreational audio device according to claim 5,
2 wherein said low frequency range volume is adjustable.

1 16. The waterproof recreational audio device according to claim 5,
2 wherein said mid frequency range volume is adjustable.

1 17. The waterproof recreational audio device according to claim 5,
2 wherein said high frequency range volume is adjustable

1 18. The waterproof recreational audio device according to claim 1,
2 wherein said mid frequency range has a fixed maximum signal level of 90
3 dBa for 8 hours.

1 19. The waterproof recreational audio device of claim 1, wherein said
2 waterproof recreational audio device transmits a musical signal of a high
3 fidelity frequency response across a broad frequency range where there is:
4 a low frequency response is in the range of 40 - 1000 Hz
5 a mid frequency response is in the range of 250 - 6000 Hz, and
6 a high frequency response is in the range of 5000 - 20,000 Hz.

1 20. The waterproof recreational audio device of claim 19, wherein said
2 at least one transducer includes an ultrasonic transducer.

1 21. The waterproof recreational audio device of claim 19, wherein said
2 at least one transducer includes a vibrotactile transducer.

1 22. The waterproof recreational audio device of claim 19, wherein said
2 waterproof recreational audio device includes an adjusting capability for
3 the mid range frequency response, such that:
4 said mid frequency range volume can be adjusted to allow
5 environmental noise to be heard by the user,
6 said mid frequency range has a fixed maximum level to minimize
7 nuisance noise for individuals near said waterproof recreational audio
8 device, and
9 said mid range has a fixed maximum level to restrict harmful dB
10 noise levels for user.

1 23. The waterproof recreational audio device of claim 19, wherein a
2 volume of said low frequency range is adjustable.

1 24. The waterproof recreational audio device of claim 19, wherein a
2 volume of said mid frequency range is adjustable.

1 25. The waterproof recreational audio device of claim 19, wherein a
2 volume of said high frequency range is adjustable.

1 26. The waterproof recreational audio device of claim 19, wherein said
2 mid frequency range has a fixed maximum signal level of 90 dBa for 8
3 hours.

1 27. The waterproof recreational audio device of claim 1 further
2 comprising a sound source in communication with said at least one

3 transducer, said sound source generating a music signal which is received
4 by said at least one transducer.

1 28. The waterproof recreation audio device of claim 27 wherein said
2 communication between said sound source and said at least one transducer
3 is via a wired connection.

1 29. The waterproof recreation audio device of claim 27 wherein said
2 communication between said sound source and said at least one transducer
3 is via a wireless connection.

1 30. The waterproof recreation audio device of claim 27 wherein said
2 sound source is affixed to said means for said at least one transducer to be
3 in contact with the head of said user.

1 31. The waterproof recreation audio device of claim 27 wherein said
2 sound source is selected from the group consisting of MP3 player, tape
3 player, radio, audio transceiver, and disc player.

1 32. A recreational audio device, comprising:
2 at least one transducer which enables music to be heard by a user
3 via transcutaneous bone conduction; and
4 a support which supports said at least one transducer in contact
5 with a head of a user at a plurality of locations around the head of said
6 user.

1 33. The recreational audio device according to claim 32 wherein said at
2 least one transducer includes a plurality of transducers.

1 34. The recreational audio device according to claim 32 wherein said at
2 least one transducer can be removed from said support and re-positioned at
3 at least one different location on said support.

1 35. The recreational audio device according to claim 32 wherein said at
2 least one transducer can slide to different locations on said support.

1 36. The recreational audio device according to claim 32 wherein said
2 support can be oriented at multiple orientations relative to a head of a user.

1 37. The recreational audio device of claim 36 wherein said support is a
2 head band.

1 38. The recreational audio device of claim 32 further comprising
2 waterproofing for said at least one transducer.

1 39. The recreational audio device of claim 32 further comprising a sound
2 source for conveying musical signals to said at least one transducer.

1 40. A method for a user to listen to music via transcutaneous bone
2 conduction, comprising the steps of:
3 supplying musical signals from a source to at least one transducer
4 capable of transcutaneous bone conduction;
5 contacting a user's head with said at least one transducer; and
6 transmitting by transcutaneous bone conduction said musical signal
7 to the user.

1 41. The method recited in claim 40, further comprising a step of tuning
2 musical sound heard by a user.

1 42. The method of claim 41 wherein said step of tuning comprises
2 changing point of contact of at least one transducer on a user's head.

1 43. The method of claim 42 wherein changing is accomplished by
2 repositioning a support which supports said at least one transducer on said
3 user's head.

1 44. The method of claim 42 wherein changing is accomplished by
2 repositioning said at least one transducer on a support which supports said
3 at least one transducer.

1 45. The method of claim 42 wherein changing is accomplished by sliding
2 said at least one transducer to a different location on a support which
3 supports said at least one transducer.

1 46. The method of claim 40 comprising adjusting volume of at least one a
2 high, mid, or low frequency transmitted via transcutaneous bone
3 conduction via said at least one transducer.

1 47. The method of claim 40 further comprising limiting a mid frequency
2 range has a fixed maximum signal level of 90 dBa for 8 hours.